AMENDMENTS TO CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A method for utterance verification comprising the steps of:

(A) extracting a sequence of feature vectors from an input speech;

(B) inputting the sequence of feature vectors to a speech recognizer for obtaining at least one candidate string;

(C) segmenting the input speech into at least one speech segment according to the content of candidate string, which comprises individual recognition units, wherein each speech segment corresponds to a recognition unit and each recognition unit corresponds to a verification unit;

(D) generating a sequence of verification feature vectors for each speech segment according to the sequence of feature vectors of the speech segment, wherein the verification feature vectors are generated by normalizing the feature vectors using the normalization parameters of the verification unit corresponding to the speech segment;

(E) utilizing a verification-unit corresponded classifier for each speech segment to calculate the verification score, where the sequence of verification feature vectors of the speech segment is used as the input of the classifier;

(F) combining the verification scores of all speech segments for obtaining an utterance verification score of the candidate string; and

(G) comparing the utterance verification score of the candidate string with a predetermined threshold so as to accept the candidate string if the utterance verification score is larger than the predetermined threshold.

2.(Original) The method as claimed in claim 1, wherein in step (D), the normalization parameters of the verification unit are the means and the standard deviations of the feature vectors corresponding to the verification unit in training data, and these parameters are calculated in advance.

3. (Original) The method as claimed in claim 1, wherein in step (E), the classifier is a neural network, and the neural network is an MLP (multi-layer perceptron).

4. (Original)The method as claimed in claim 3, wherein the MLP is used to calculate the verification score by inputting the verification feature vector and performing the feed-forward processing, the verification score of a speech segment is the mean of the verification scores of the sequence of verification feature vectors corresponding to the speech segment.

5. (Original) The method as claimed in claim 3, wherein the MLP is trained by using an error back-propagation algorithm to reduce the mean square error between the verification score output of the MLP and the target value.

6. (Original) The method as claimed in claim 5, wherein the MLP corresponding to the verification unit is trained by inputting the sequences of verification feature vectors of the speech segments corresponding to the verification unit and the sequences of verification feature vectors of the speech segments not corresponding to the verification unit.

7. (Original) The method as claimed in claim 6, wherein the target value is 1 if the speech segment corresponds to the verification unit and which is 0 if the speech segment does not correspond to the verification unit.

8. (Original) The method as claimed in claim 1, wherein in step (F), the utterance verification score of the candidate string is the mean of the verification scores of the speech segments in the input speech.

9. (Currently Amended) The method as claimed in claim 1, wherein the input speech is corrupted by noise with different power levels of SNR (Signal to Noise Ratio).

10. (Currently Amended) The method as claimed in claim 6, wherein the speech segments used for training are corrupted by noise with different power levels of SNR (Signal to Noise Ratio).

11. (Original) A system for utterance verification comprising:

a feature vector extraction module for extracting a sequence of feature vectors from an input speech;

a speech recognition module for obtaining at least one candidate string by inputting the sequence of feature vectors;

a speech segmentation module for segmenting the input speech into at least one speech segment according to the content of candidate string, which comprises individual recognition units, wherein each speech segment corresponds to a recognition unit and each recognition unit corresponds to a verification unit;

a verification feature vector generation module for generating a sequence of verification feature vectors for

each speech segment according to the sequence of feature vectors of the speech segment, wherein the verification feature vectors are generated by normalizing the feature vectors using the normalization parameters of the verification unit corresponding to the speech segment;

a verification score calculation module for utilizing a verification-unit corresponded classifier for each speech segment to calculate the verification score, where the sequence of verification feature vectors of the speech segment is used as the input of the classifier;

a verification score combination module for combining the verification scores of all speech segments for obtaining an utterance verification score of the candidate string; and

a decision module for comparing the utterance verification score of the candidate string with a predetermined threshold so as to accept the candidate string if the utterance verification score is larger than the predetermined threshold.

12. (Original) The system as claimed in claim 11, wherein in the verification feature vector generation module, the normalization parameters of the verification unit are the means and the standard deviations of the feature vectors corresponding to the verification unit in training data, and these parameters are calculated in advance.

13. (Original) The system as claimed in claim 11, wherein the classifier is a neural network, and the neural network is an MLP (multi-layer perceptron).

14. (Original) The system as claimed in claim 13, wherein the MLP is used to calculate the verification score by inputting the verification feature vector and performing the feed-forward processing, the verification score of a

speech segment is the mean of the verification scores of the sequence of verification feature vectors corresponding to the speech segment.

15. (Original) The system as claimed in claim 13, wherein the MLP is trained by using an error back-propagation algorithm to reduce the mean square error between the verification score output of the MLP and the target value.

16. (Original) The system as claimed in claim 15, wherein the MLP corresponding to the verification unit is trained by inputting the sequences of verification feature vectors of the speech segments corresponding to the verification unit and the sequences of verification feature vectors of the speech segments not corresponding to the verification unit.

17. (Original) The system as claimed in claim 16, wherein the target value is 1 if the speech segment corresponds to the verification unit and which is 0 if the speech segment does not correspond to the verification unit.

18. (Original) The system as claimed in claim 11, wherein in the verification score combination module, the utterance verification score of the candidate string is the mean of the verification scores of the speech segments in the input speech.

19. (Currently Amended) The system as claimed in claim 11, wherein the input speech is corrupted by noise with different power levels of SNR (Signal to Noise Ratio).

20. (Currently Amended) The system as claimed in claim 16, wherein the speech segments used for training are corrupted

by noise with different power levels of SNR (Signal to Noise Ratio).